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Abstracts

Theme 8 “Metamorphic petrology”

(sorted alphabetically by first author)

Experimental study of some mantle metasomatism reactions at 3-5 GPa

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This work summarizes previous and new experimental data on the study of the reactions forming phlogopite and chromium-bearing potassium titanates of the crichtonite, magnetoplumbite and hollandite groups, which are indicative minerals characterizing various stages of the modal metasomatism in the upper mantle. The reactions of the phlogopite formation in the orthopyroxene-garnet system in presence of H₂O-KCl fluid at 3 and 5 GPa and 900-1000 ° C simulate the processes of phlogopite formation in garnet peridotites and pyroxenites. The experiments demonstrated regular changes in the Ca and Cr content in garnet, Al in pyroxenes, as well as the composition of newly formed phlogopite, in dependence on the concentration of the potassium component in the fluid. Experiments on the formation of potassium titanates (imengite, matiasite, and priderite) in the chromite - rutile / ilmenite - K₂CO₃ - H₂O-CO₂ system at 3.5 and 5 GPa proved the possibility of the formation of these minerals during the reactions of chromite with a potassium water-carbonate fluid. However, the formation of titanates does not occur directly after chromite, but requires additional sources of Ti and Fe, which are rutile and ilmenite. Thus, the experiments confirmed the conclusion that the formation of titanates characterizes the most advanced stages of metasomatism in mantle peridotites. The formation of assemblages of these titanates with phlogopite characterizes higher concentrations of the potassium component in the fluid than the formation of phlogopite alone. The relationship between the various titanates is also a function of the activity of the potassium component in the fluid. The regularities revealed in the experiments illustrate well the features of mineral assemblages and compositional variations of minerals in metasomatized peridotites of the lithospheric mantle.